CLAIMS

What is claimed is:

1. An impact printer comprising:

a plurality of hammers having printing tips;

a print ribbon for printing by impacts from said printing tips;

an electrical drive for causing said hammers to drive said printing tips against said print ribbon;

a supply of ink, wherein said ink comprises a mixture of two or more inks each ink having a different viscosity at the same temperature;

a reservoir roller for supplying said ink to said print ribbon;

at least one pump connected to said ink supply for supplying ink to said roller;

a sensor for determining the amount of ink on said ink ribbon;

at least one channel within said reservoir roller connected for fluid flow from said pump; and

a circuit for causing said pump to pump ink to said reservoir roller when said sensor senses an ink condition on said ribbon.

2. The impact printer of Claim 1, wherein said temperature is approximately 25°C.

3. The impact printer of Claim 1, wherein said print ribbon is at least approximately 0.0045" thick.

4. The impact printer of Claim 1, further

comprising an ink-out detection circuit coupled to said at least one pump for determining when said supply of ink is depleted by monitoring changes in current.

5. The impact printer of Claim 4, wherein the ink-out detection circuit comprises:

an electromechanical device coupled to said at least one pump for actuating said pump;

a resistor coupled to the electromechanical device; and

a processor coupled to said resistor for monitoring the current through said resistor.

6. The impact printer of Claim 5, wherein the electromechanical device is a solenoid.

7. An ink density control system for an ink ribbon of an impact printer, comprising:

a reservoir roller formed of an ink absorbent material;

at least one channel within said roller for delivering ink to said reservoir roller;

a pump connected to an ink supply for pumping ink to said channel;

a sensor for sensing the density of ink on said print ribbon; and

an electrical drive responsive to said sensor as to ink density for driving said pump for flow of ink to said channel.

8. The ink density control system of Claim 7, wherein said ink is a multi-viscosity ink.

9. The ink density control system of Claim 7, wherein said sensor senses ink on different segments or zones of said ribbon, and further comprising two or more channels in said reservoir roller for distributing ink to two or more portions or segments of said reservoir roller depending on the ink sensed at a particular segment or zone of said ribbon.

10. The ink density control system of Claim 7, wherein said ink is an ink having a viscosity of at least approximately 1000 cps at 25°C.

11. The ink density control system of Claim 7, wherein said ribbon is at least approximately 0.0045" thick.

12. The ink density control system of Claim 7, further comprising an ink-out detection circuit coupled to said pump for determining when said supply of ink is depleted by monitoring changes in current.

13. The impact printer of Claim 12, wherein the ink-out detection circuit comprises:

an electromechanical device coupled to said pump for actuating said pump;

a resistor coupled to the electromechanical device; and

a processor coupled to said resistor for monitoring the current through said resistor.

14. A line printer comprising:

a plurality of print hammers having printing tips mounted on a hammerbank;

a permanent magnet for retaining said hammers;

a coil in associated relationship with each hammer for overcoming the permanent magnetic retention;

a print ribbon which traverses across said printing tips between two spools and is impacted by the printing tips to provide printing on a print media;

a porous reservoir roller having two or more segments which can receive ink in different quantities;

two or more channels within said reservoir roller, each connected to a respective segment of said reservoir roller;

an ink transfer roller for transferring ink to said print ribbon from said reservoir roller;

a sensor having two or more respective sensing portions for determining an amount of ink on said ribbon at two or more respective segments of said ribbon;

one or more pumps for pumping ink to said channels at a rate consistent with the ink requirements of a segment of said print ribbon;

a controller for causing said one or more pumps to pump ink in response to the amount of ink sensed by said sensor to a respective segment of said roller corresponding to a segment of said ribbon; and

a circuit coupled to at least one of said one

or more pumps for determining, by monitoring changes in current, when a supply of said ink is depleted.

15. The line printer of Claim 14, wherein the circuit comprises:

an electromechanical device coupled to said one or more pumps for driving said one or more pumps;

a resistor coupled to the electromechanical device; and

a processor coupled to said resistor for monitoring the current through said resistor.

16. The line printer of Claim 15, wherein said electromechanical device is a solenoid.

17. The line printer of Claim 16, wherein said one or more pumps has a diaphragm that is driven by said solenoid and actuated by an electrical pulse to said solenoid, and further comprising an inlet and outlet valve connected to a chamber overlying said diaphragm.

18. The line printer of Claim 14, wherein said ink is a high viscosity ink having a viscosity of at least 1000 cps at 25°C.

19. The line printer of Claim 14, wherein said ink comprises two or more single viscosity inks, each single viscosity ink having a different viscosity at a given temperature.

20. The line printer of Claim 14, wherein said print ribbon is at least approximately 0.0045" thick.

21. A re-inker for a printer comprising:

an ink-retaining reservoir roller segmented into at least two segments for supplying multi-viscosity ink to two or more respective segments of an ink ribbon;

two or more channels interiorly of said reservoir roller for flowing ink to respective segments of said reservoir roller;

a pump coupled to each of said channels and an ink supply;

a sensor for sensing a quantity of ink on respective segments of said print ribbon; and

an electrical drive for causing said pump to pump ink to a channel in response to said sensor for re-inking a segment of said ink ribbon.

22. The re-inker of Claim 21, wherein said multi-viscosity ink comprises at least two single viscosity inks with different viscosities at the same temperature.

23. The re-inker of Claim 22, wherein the temperature is approximately 25°C.

24. The re-inker of Claim 21, wherein said ink ribbon is at least approximately 0.0045" thick.

25. The re-inker of Claim 21, further comprising

a circuit coupled to said pump for determining, by monitoring changes in current, when said ink supply is depleted.

26. A method of printing comprising:

providing a printer having a plurality of hammers having printing tips that impact a print ribbon;

feeding a media to be printed upon by impact of said printing tips against said print ribbon;

sensing the amount of ink on said print ribbon, wherein said ink comprises at least a high viscosity ink;

providing an ink-retaining reservoir roller;

providing a pump for pumping ink to said reservoir roller; and

pumping ink to said reservoir roller in response to the amount of ink sensed on said print ribbon.

27. The method of Claim 26, wherein said ink further comprises a low viscosity ink.

28. The method of Claim 26, wherein said print ribbon is at least approximately 0.0045" thick.

29. The method of Claim 26, further comprising sensing changes in current associated with said pumping, wherein said changes indicate an amount of ink remaining in an ink supply.

30. A method of re-inking a print ribbon

comprising:

providing a source of ink, said ink comprising at least one high viscosity ink;

sensing the amount of ink on said print ribbon by light reflectance;

providing a porous reservoir roller which can receive ink within its interstices;

pumping ink from said ink source to said reservoir roller;

distributing ink pumped to said reservoir roller in response to the amount of ink sensed on said print ribbon to at least two distinct segments of said reservoir roller; and

applying ink from said reservoir roller to at least two distinct segments of said print ribbon.

31. The method of Claim 30, wherein said ink further comprises at least one low viscosity ink.

32. The method of Claim 30, wherein said print ribbon is at least approximately 0.0045" thick.

33. The method of Claim 30, further comprising sensing changes in current associated with said pumping, wherein said changes are used to indicate when said ink source is empty.

34. The method of Claim 33, further comprising filling said ink source when said ink source is completely empty.

35. A re-inker for a printer comprising:

an ink reservoir roller having an absorbent portion for supplying ink to an ink ribbon;

at least one channel interiorly of said reservoir roller for flowing ink to said absorbent portion of said reservoir roller;

a pump connected to said at least one channel and an ink supply;

a sensor for sensing a quantity of ink on said print ribbon; and

an electrical drive for causing said pump to pump ink to said at least one channel in response to said sensor for re-inking said ink ribbon.

36. The re-inker of Claim 35, wherein said ink is a high viscosity ink having a viscosity of at least approximately 1000 cps.

37. The re-inker of Claim 35, wherein said ink is a multi-viscosity ink.

38. The re-inker of Claim 35, wherein said ink ribbon is at least approximately 0.0045" thick.

39. The re-inker of Claim 35, further comprising a circuit coupled to said pump for determining when said ink supply is depleted, wherein said determining comprises monitoring changes in current.

40. A method of printing comprising:

providing a printer having a plurality of hammers having printing tips that impact a print ribbon;

providing a media to be printed upon by impact of said printing tips against said print ribbon;

sensing the amount of ink on said print ribbon;

providing an ink absorbent reservoir roller;

providing a pump for pumping ink to said reservoir roller; and

pumping ink to said reservoir roller in response to the amount of ink sensed on said print ribbon, wherein said ink comprises at least one ink having a high viscosity.

41. The method of Claim 40, wherein said ink further comprises at least one ink having a low viscosity.

42. The method of Claim 40, wherein said print ribbon is at least approximately 0.0045" thick.

43. The method of Claim 40, further comprising monitoring a current profile associated with said pumping, wherein said monitoring is used to determine when a supply of said ink is depleted.

44. A method of re-inking a print ribbon comprising:

providing a source of ink having at least one ink of high viscosity;

sensing the amount of ink on said print ribbon;

providing a reservoir roller having a porous

portion which can receive ink within its interstices;

pumping ink from said ink source to said reservoir roller in response to the amount of ink sensed on said print ribbon;

distributing ink pumped to said reservoir to the porous portion of said reservoir roller; and

providing ink from the porous portion of said reservoir roller to said print ribbon.

45. The method of Claim 44, wherein said ink further comprises at least one ink of low viscosity.

46. The method of Claim 44, wherein said print ribbon is at least approximately 0.0045" thick.

47. The method of Claim 44, further comprising monitoring a current profile associated with said pumping, wherein said monitoring is used to determine when said ink source is depleted.

48. The method of Claim 47, further comprising filling said ink source when said ink source is completed depleted.